

## Well-being measures for younger children

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**Running head: VALIDATING CHILDREN'S SUBJECTIVE WELL-BEING MEASURES**

**Title: Well-being measures for younger children**

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**Author contributions:** RS, JS and LR designed the study, interpreted the results and wrote the paper. RS and ran the data analysis. RS and LR carried out fieldwork data collection.

## **Abstract**

Understanding variations in children's well-being is key to addressing inequalities. It is especially useful to understand children's own perspectives, although there is a lack of short questionnaires using simple language which can be administered to younger children (or in situations when testing-time is limited). Here we first present the VSWQ-C, a *Very Short Well-being Questionnaire for Children*, which captures health-related quality-of-life in a brief questionnaire for both older and younger child responders. We provide preliminary validation evidence for this new measure from two English samples of children aged 6-7 and 9-10 year olds. Next, we also adapted an existing measure of children's *emotional* well-being (10-item

*Positive and Negative Effect Schedule for Children*; Ebesutani et al., 2012) again to be suitable for a younger cohort. Our adaptation, the *Definitional Positive and Negative Effect Schedule for Children (dPANAS-C)*, provides children as young as 6 with age-appropriate definitions of questionnaire vocabulary. We again present preliminary validation evidence from 9-10 year olds, as well as children 6-7 years (i.e., 1-2 years younger than the original version of this questionnaire had been psychometrically developed for). We looked too at demographic influences, and show that older children report greater well-being (in the VSWQ-C) as well as lower negative affect (in the dPANAS-C), but without gender differences. Our findings show that our tools eliciting self-reports of well-being are valuable and valid instruments for children as young as 6 years, with acceptable reliability and strong convergent validity.

Key words: Well-being, PANAS-C, quality-of-life, self-report, mental health

## **Public Significance Statement**

This study presents two questionnaires to measure self-report in very young children (6+ years). They provide fast and simple assessments of global and emotional well-being, using age-appropriate vocabulary. They are suitable for both younger and older children, and can be administered within a classroom setting, using either pencil-and-paper or tablet.

## **Introduction**

Recent reports have highlighted significant differences among children in their well-being, and these differences can fall along both geographic and demographic lines. Well-being differences can be found across countries (Currie et al., 2012; Inchley et al., 2016; UNICEF Office of Research, 2016) where the UK performs particularly poorly, and where ten percent of British children show evidence of well-being deficits linked to mental health (Fonagy & Murphy, 2013). Differences in well-being have also been found for different demographic groups (see for example, “Good Childhood report”, Society, 2017). In recent years, interest in children's well-being has risen sharply, and it now represents an outcome measure in its own right within UK educational policy. For example, the *Every Child Matters* agenda (Department for Education and Skills, 2003, Her Majesty's Government, 2004), aimed to support children's well-being across multiple domains (e.g., *Be healthy, Enjoy and achieve*). These measures place enhanced quality-of-life firmly on the agenda for children from birth, and early intervention is known to bring long-term benefits (Allen, 2011; Barnett & Hustedt, 2005; Melhuish, Belsky, & Barnes, 2010; Sammons et al., 2015).

But in order to measure the impact of well-being interventions, researchers require standardised testing tools for children starting at a young age. Particularly important would be questionnaires that elicit younger children's perspectives on their own well-being. Such questionnaires should have the capacity to be administered quickly, and if need be, in groups of children within

classroom cohorts. For young children however, such testing tools currently do not exist. Although there are several well-validated well-being measures for older children (age 8+ years; see below) there are fewer resources for younger children, or for children with limited comprehension or attention. In our study we recognise the need for such measures and here present two short, easily-administered well-being questionnaires. These self-report measures elicit children's perspectives on their own well-being. Our first measure is a *novel* questionnaire to elicit *health-related quality-of-life* well-being, and our second is an *adaptation of an existing* questionnaire to elicit *emotional* well-being. Here we have validated these questionnaires on children from the age of 6 years (but they could potentially be extended to children age 5 with appropriate validation and adult support; see below).

To understand better the focus of our measures it is important to recognise that subjective well-being is a broad construct (Pollard & Lee, 2003). It has been defined within the literature to include a range of concepts such as aspects of life satisfaction (Diener, 2000), hedonic well-being (e.g. emotional stability, good mental health), eudaemonic well-being (e.g. positive mental attitude, fulfillment, e.g. Ryff, Lee, & Keyes, 1995), and bodily or health-related well-being (e.g., Erhart et al., 2009). And health-related quality-of-life (HRQL) strives to incorporate multiple aspects of function that impact on overall life satisfaction, including aspects of psychological, physical and social well-being (Erhart et al., 2009; The Whoqol Group, 1998), as well as health status itself. Early measures of HRQL were largely targeted at patients under-going medical treatment (Devlin, Shah, Feng, Mulhern, & van Hout, 2018; Longworth et al., 2014) but have since been expanded as a useful tool for general population samples in more recent years (Dumuid et al., 2017). Finally, a similar wide-ranging palette applies to concepts of well-being in children. The literature on childhood well-being is extremely heterogeneous, often focussing on just a single dimension within what is thought to

be a multi-dimensional concept (Ben-Arieh & Frønes, 2007; Casas, 2019; McLellan & Steward, 2015; Newland et al., 2019; Pollard & Lee, 2003). And McLellan and Steward (2015) have pointed out that concepts of well-being in adults cannot be applied automatically to children without considerable scrutiny. Moreover, well-being definitions for children are also contextually dependent (Coleman, 2009; De Los Reyes et al., 2015) in that children may have different levels of well-being in different contexts, such as home versus school. Understanding childhood well-being is important because differences in well-being relate to inequalities in a number of important outcomes. For example, lower levels of well-being have been linked to lower educational attainment (Lindeboom, van den Berg, von Hinke Kessler Scholder, & Washbrook, 2010; (Sammons et al., 2008); Morrison Gutman & Vorhaus, 2012), school exclusions (Parry-Langdon, Clements, Fletcher, & Goodman, 2008) poorer behaviour (Sylva et al., 2008), and lowered life chances (Cornaglia, Crivellaro, & McNally, 2015). But importantly, by asking children about their own experiences -- in areas such as schooling, peer relationships and home life -- we allow them a sense of agency to speak for themselves.

Childhood self-report questionnaires are almost exclusively available only for older children. For example *KIDSCREEN* (8 years +; Ravens-Sieberer & Kidscreen Group Europe, 2006), *PANAS-C* (*Positive and Negative Effect Schedule for Children*; 8+; Laurent et al., 1999), the *Stirling Children's Well-being Scale* (Liddle & Carter, 2015; 8+) and the *Youth Quality-of-life Instrument* (Edwards, Huebner, Connell, & Patrick, 2002; age 12+). Although well-being can be measured for younger children using interview-based techniques (such as the *Berkeley Puppet Interview*; Measelle, Ablow, Cowan, & Cowan, 1998) such methods are labour-intensive, and often focus on specific affective domains such as anxiety, depression or behavioural issues (e.g. Ringoot et al., 2017). Other scales tend to focus more heavily on specific health-related aspects of well-being such as mobility (e.g. *Pediatric Quality-of-life*

*Inventory*; for pediatric patients age 8+; Varni, Limbers, & Burwinkle, 2007), or illness (e.g., *Child Health and Illness Profile-Adolescent Edition*; for pediatric patients age 12+, Altshuler & Poertner, 2002). The length of these measures and their semantic complexity make them more difficult to implement with younger children or when time or participants' attention-spans are limited.

Despite the absence of measures for younger children, such measures could well be viable. Children as young as six have been found to make accurate judgements about their health status (Rebok et al., 2001; Riley, 2004), their personality (Maćkiewicz & Ciecuch, 2016; Measelle, John, Ablow, Cowan, & Cowan, 2005; 5-7), their emotions (Durbin, 2010; 3-6) and their mental health (Arseneault, Kim-Cohen, Taylor, Caspi, & Moffitt, 2005; 5-7). Younger age groups of 5-7 years have also been found to accurately report self-concept (Brown, Mangelsdorf, Agathen, & Ho, 2008; Measelle et al., 1998) and health-related well-being in the case of paediatric patients (Varni et al., 2007). A number of these findings have been achieved using puppet interviews (e.g., Brown et al., 2008) or drawing-based assessments (Bodwin & Bruck, 1960; Thomas & Jolley, 1998) although it is possible that written self-report questionnaires may be just as effective so long as these are designed to be age-appropriate (and this was our aim here).

Finally, alternative approaches to measuring well-being in younger children largely rely on parental reporting (e.g., Achenbach & Rescorla, 2002; Dunn, Burlingame, Walbridge, Smith, & Crum, 2005; Goodman, 2001). However, parents' perspectives diverge somewhat from the child's, particularly for children's well-being or personality (Eiser & Morse, 2001). For example, although children's perspectives on their personalities are closer to their parent's than their teacher's (Barbaranelli, Caprara, Rabasca, & Pastorelli, 2003; Halverson et al., 2003) both

of these adult perspectives are far removed from the child's own perspective, with low convergence for all domains except *Openness to Experience* (Barbaranelli et al., 2003; see also De Clercq, De Fruyt, Koot, & Benoit, 2004). Similarly, although a mother's perspectives on her young child's well-being or personality (e.g., their timidity, agreeableness, happiness, negative affect) correlate with the child's perspectives to some extent, the relationship is modest at best (around  $r = .3-.4$ , Brown et al., 2008; Holder, Coleman, & Wallace, 2010). Since parents have perspectives that differ from their children, measures that take children's own perspectives into account would be particularly important. An additional motivation for the use of child self-report is their predictive power (Ialongo, Edelsohn, & Kellam, 2001). But more importantly they might also serve to increase the validity of adult assessments through the triangulation of perspectives. This may be of particular importance in areas that are less visible, such as internalising behaviours or depression (Hart, Lahey, Loeber, & Hanson, 1994; Jensen et al., 1999).

In summary, we here present two new measures of well-being in younger children (one entirely novel, and the other one, a new adaptation). These questionnaires are very short, and use linguistically simple language, but are closely related to longer, more linguistically complex instruments designed for older children (e.g., PANAS-C). Our measures benefit from being questionnaires that can be administered quickly, within a class setting if necessary, on an electronic tablet if desired, and to young primary-school aged children. As such, they would also represent a valuable screening-tool for larger numbers of children, or when time constraints limit the use of longer diagnostic tests.

### **Experimental Investigation: Assessing Self-Reported Well-being in Children 6+ Years**

In the current study we first designed a very short well-being questionnaire to assess children's



quality-of-life in health and well-being. Our novel self-report questionnaire, which we name the *Very Short Well-being Questionnaire for Children (VSWQ-C)* contains four items which elicit the child's perspectives on how well he/she is getting on at school, at home, with friends, and within his/her own body. These four domains are areas typically of interest within longer health-related quality-of-life questionnaires (Varni, Seid, & Kurtin, 2001; Verrips et al., 1999) but we have condensed and simplified them for younger children. We collected preliminary validation evidence for our questionnaire from two samples of children of ages 6-7 years and 9-10 years, and established its validity and reliability (e.g., compared to an existing longer questionnaire; KIDSCREEN-10). We also demonstrate that our novel measure elicits the expected age-related and gender-related differences in well-being (see below).

In addition to our measure of *health-related quality-of-life* well-being, we also took an existing measure of *emotional* well-being, and modified this to suit our younger cohort. The PANAS-C was originally psychometrically developed for children from the age of 8 years (Laurent et al., 1999). Although a shorter version, the PANAS-C (short form) 10-item questionnaire was validated on a 6-18 year old sample (Ebesutani et al., 2012), the results for their youngest children were combined with those of their oldest. This made it unclear whether the PANAS-C short questionnaire is valid for young children (age 6 years) or not. Here we modified this questionnaire to ensure its language would be understandable for children of this age. We did this by providing definitions for words within questionnaire items and Likert responses, targeting specific words that would need to be defined in order to be understood by children aged 6+ years (e.g., "lively"; also by British as well as American English speakers e.g., "Mad", whose meaning differs between the UK and US). We then collected preliminary validation evidence for our modified questionnaire on the same child cohorts. We test therefore whether children from the age of 6 can reliably report both their well-being in health and quality-of-life

(VSWQ-C) and their emotional well-being (dPANAS-C) in written self-report questionnaire measures.

## **Method**

### **Participants**

We presented our measure to 1520 children (48% female; mean age 8.5, range 6.2-10.6, S.D. 1.5) from 21 state-maintained primary schools in England. Seventeen testing sites were all-through primary schools (infant and junior combined), two were infant-only schools and two were junior-only. Disadvantage, measured by the percentage of pupils entitled to the UK benefit of Free School Meals, averaged at 13.3% (range 0.7-38.1%). Our children were drawn from school two year groups, with 702 children from Year 2 (48% female; mean age 6.9, range 6.2-7.6, S.D. 0.3) and 818 children from Year 5 (48% female; mean age 9.9, range 9.2-10.6, S.D. 0.3). **Full descriptive details shown in Table 1.** An additional 19 children were excluded from our study (seven were out of year group, or had participated at another school, or had recently arrived in the UK so had little or no English; two experienced a technical failure with the electronic tablets on which we presented the questionnaire; and 10 failed to answer all the questions). We tested entire school years meaning that our sample included children of all abilities, including those with Special Educational Needs (SEN). Although SEN status was not taken directly, we would expect 10-15% of children within our sample to have some kind of SEN, based on national figures (Department for Education (DfE), 2017b). Our study was approved by the University's Science and Technology Research Ethics Committee.

**Table 1.**

### *Sample characteristics*

	N			Age		
	Both	Male	Female	Mean	SD	Range
All	1520	786 (52.7%)	734 (48.3%)	8.5	1.5	6.2-10.6
Year 2	702	362 (52.6%)	340 (48.4%)	6.9	0.3	6.2-7.6
Year 5	818	424 (51.8%)	394 (48.2%)	10.6	0.3	9.2-10.6

### **Measures**

**The Very Short Well-being Questionnaire for Children (VSWQ-C):** The VSWQ-C is our own 4-item self-report questionnaire which covers key areas of children's lives: *home life, school life, friends and health*. Its four positively-worded questions were *Have you got on well in class? Have you got on well at home? Have you got on well with friends? and Has your body felt well?* (see Appendix 2 for screen-shots). Responses were given on a 5 point Likert-style scale: *Never, Hardly ever, Sometimes, Mostly, or Always*.

Our VSWQ-C tool was originally developed from a consideration of the Health Related Quality-of-life literature (e.g., Ravens-Sieberer & Kidscreen Group Europe, 2006; Solans et al., 2008). Our questionnaire was designed to be very brief for fast administration, but to cover key levels of well-being with at least three items to make a robust scale (see Hair, 2010; Marsh, Hau, Balla, & Grayson, 1998; Raubenheimer, 2004). Emotional well-being was not included as this is covered in other brief measures (e.g., *positive affect* has 5 items in the PANAS-C short form; see below). All words within our VSWQ-C questionnaire were checked for their age of acquisition using the psycholinguistics database N-Watch (Bird, Franklin, & Howard, 2001; Gilhooly & Logie, 1980; Stadthagen-Gonzalez & Davis, 2006) and were selected to be words learned on average before the age of 5 years. The average word-length in syllables was

1.09 and we independently assessed each question for readability: the average Flesch-Kincaid grade level for our questions was 1.7 (Kincaid, Fishburne Jr, Rogers, & Chissom, 1975), which corresponds to Year 1 in the education system of England. (We point out that this paper provides preliminary validation of the VSWQ-C within a UK sample, and as such may require language adaptation if either translated into other languages or dialects.)

**The *Definitional Positive and Negative Affect Schedule for Children* (dPANAS-C).** Our second measure was an adaption of the PANAS-C (short form) 10-item children's questionnaire (Ebesutani et al., 2012; see above for limitations on how this has been validated previously) which itself was based on an original longer 27-item PANAS-C scale (Laurent et al., 1999) and prior to that, an original PANAS questionnaire for adults (Watson, Clark, & Tellegen, 1988). The original 27-item scale for children had strong psychometric properties (Ebesutani et al., 2012) and the original 10-item PANAS-C (short form) scale had good internal consistency, and good discriminatory validity (for children diagnosed with Anxiety and Depression; Ebesutani et al., 2012). All PANAS scales are split into two domains: *Positive Affect* relates to feelings of enthusiasm, alertness, and activity (Ebesutani et al., 2012), and *Negative Affect* relates to feelings such as sadness, fear, guilt and anger (Ebesutani et al., 2012). The original 10-item PANAS-C (short form) presented 5 adjectives in each scale (e.g., happy, fearful: dPANAS-C-POS and dPANAS-C-NEG) along with a 5-point Likert scale (*Very slightly or not at all, A little, Moderately, Quite a bit, Extremely*). Our early piloting revealed 6 year old children did not understand certain words (e.g., *Lively, Moderately*) because they are linguistically low in frequency and typically learned later in childhood (Kuperman, Stadthagen-Gonzalez, & Brysbaert, 2012). In our own adaptation (dPANAS-C) we therefore modified the questionnaire to give definitions for any unfamiliar mood adjectives, and for every item in the Likert scale. We presented the former as speech bubbles

(see Appendix 1) and the latter as part of our response buttons. For example, the item ‘lively’ is presented on-screen with a speech bubble that states “*Lively means bouncy & energetic*”, and the 5 Likert response buttons each have a definition below in brackets and smaller font (e.g., *Extremely* (.....*very very very*)). This can be seen in Appendix 1 which gives our full *Definitional Positive and Negative Affect Schedule for Children (dPANAS-C)* in screen shots. The *dPANAS-C* was adapted with permission from the short form of the PANAS-C (Ebesutani et al., 2012), a modified version of the PANAS-X.

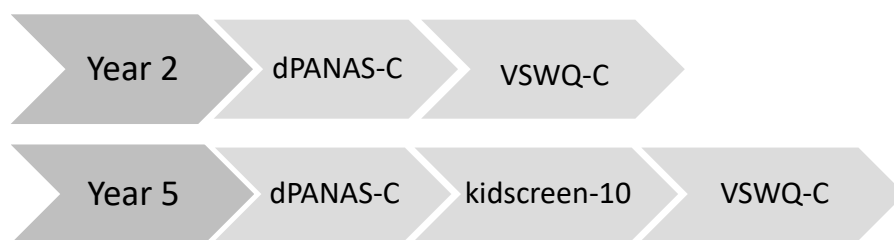
**KIDSCREEN-10** (Erhart et al., 2009): We included this existing questionnaire as a comparison measure against which to evaluate our novel tools. The KIDSCREEN-10 is a 10-item questionnaire asking children to reflect on how they have been feeling over the last week. Within this we used the general *Quality-of-life (QOL)* questionnaire designed for 8-18 year olds, which includes items from five well-being domains: *autonomy and parent relation, peers and social support, school enjoyment, physical well-being, and psychological well-being*. Answers were on a five point Likert scale from *Never* to *Always*, or from *Not at all* to *Extremely* (with intermediate points at, respectively, *Seldom/ Slightly; Quite often/ Moderately; Very often/ Very*). The KIDSCREEN-10 has high internal consistency (0.82) and test-retest reliability ( $r=0.73$ ), as well as being highly predictive of psychosomatic complaints (effect size,  $d = 1.69$ ; Ravens-Sieberer & Kidscreen Group Europe, 2006). For our Year 5 sample (our only cohort to complete the questionnaire) the internal consistency was also good ( $\alpha = 0.76$ ).

## Procedure

Although all our questionnaires could be administered using pencil-and-paper, we used touchscreen electronic tablets in our study which expedites data coding and analysis. Children were given individual 10” tablets, one per child. These tablets were 33 Acer Aspire SW3-016

or Acer One 10 tablets which ran on Intel® Atom TM x5-Z8300 processors with Windows 10 and 10.1" LED backlight touchscreens (1280 x 800 pixels). Tablets were assigned based on class register order.

Children were surveyed within their classes, which had an average size of 25.3 pupils (SD =5.0, range 8-32). Each class cohort was tested by three researchers at any given time. After gaining consent from gatekeepers, parents and children, our child participants were guided through the activities. The order of our measures for Year 5 pupils was dPANAS-C, KIDSCREEN-10, and VSWQ-C. The order was the same for Year 2 pupils but without KIDSCREEN-10 (this is designed for older children). See Figure x below for questionnaire schedule.



*Figure 1. Questionnaire schedule for participants*

Before each activity, the children's tablets displayed a waiting-screen (see Appendix 1 and 2). This showed the words 'About You' above a child drawn by a commissioned illustrator to be neutral for gender. This gender-neutral child had been selected from a shortlist of 7 candidate illustrations all designed to be gender-neutral, which were normed on a group of n=12 adults who rated the appearance of each illustrated child on a scale from 1 (very female) to 7 (very male). Mean ratings ranged from 2.8 to 5.3, with the winning illustration being closest to neutral with a mean rating of 3.7 (SD 1.2, where neutral is 3.5). During the instructions, the researchers held up a tablet showing the questionnaire they were about to complete, while the children's tablets displayed the waiting page.

The full scripted instructions for the dPANAS-C and VSWQ-C are shown in the Appendix, and instructions for KIDSCREEN-10 can be found in Ravens-Sieberer et al (2006). In our measures, children were asked to choose the answer that best matched how they felt during the last week. They were told there were no right or wrong answers and that nobody they knew would read their answers. In brief, as part of the instructions for the dPANAS-C children were asked to choose the answer that best matched how much they had felt a particular emotion during the last week: *“We are going to answer some questions now about feelings and emotions like happy and scared. I want you to think about yourself and how much you’ve felt that emotion this week. Press the button which matches how you have been feeling this week.”* Similarly, as part of the instructions for the VSWQ-C children were asked to choose the answer that best matched how they felt during the last week, for example they were told *“These questions ask how you felt during the last week. We want you to read the question, then choose the answer that best describes how you felt, and tap [/ tick] the answer.”* The researcher then took the children through the each of the four responses they could choose (see Appendix for full instructions).

The three measures took approximately 20 minutes to complete and were given among other measures whose additional findings are reported elsewhere (e.g., Simner, Hughes, Rinaldi, McDonald, & Smees, *in review*). Testing took place October 2016 to April 2017.

## **Results**

Before conducting our statistical analyses, we tested our data for normality. All scales for both Year 2 and Year 5 samples (dPANAS-C negative and positive affect, Kidscreen-10, VSWQ-C) failed the Kolmogorov-Smirnov test for normality, and ranged between -2 to +2 for skew and

kurtosis. Since scales were continuous and skewed (negatively for VSWQ-C, KIDSCREEN-10, dPANAS-POS; positively for dPANAS-NEG) we used appropriate parametric tests with bootstrap estimation where possible, and estimations procedures and test statistics appropriate for non-normal data otherwise.

**Table 2.**

*Descriptive information for the four well-being measures*

	N	Mean	SD	Range
VSWQ-C	1520	16.38	2.87	4-20
KIDSCREEN-10	818	38.67	5.79	15-50
dPANAS-POS	1520	18.96	4.37	5-25
dPANAS-NEG	1520	10.24	4.39	5-25

Below we first assess the reliability and validity of the VSWQ-C and dPANAS-C scales. Where relevant we compare our VSWQ-C to an existing longer questionnaire also administered to our Year 5 cohort (KIDSCREEN-10). We then further assess the usefulness of our tools by looking at key predictors of all four well-being measures simultaneously (VSWQ-C; dPANAS-C-POS; dPANAS-C-NEG; KIDSCREEN-10) within hierarchical linear modelling assessing at the impact of gender and age. Two-tailed significance tests were used and effect sizes reported where appropriate.

### ***Validating the VSWQ-C***

Scores for the VSWQ-C were calculated as an unweighted sum score (see Figure 1).



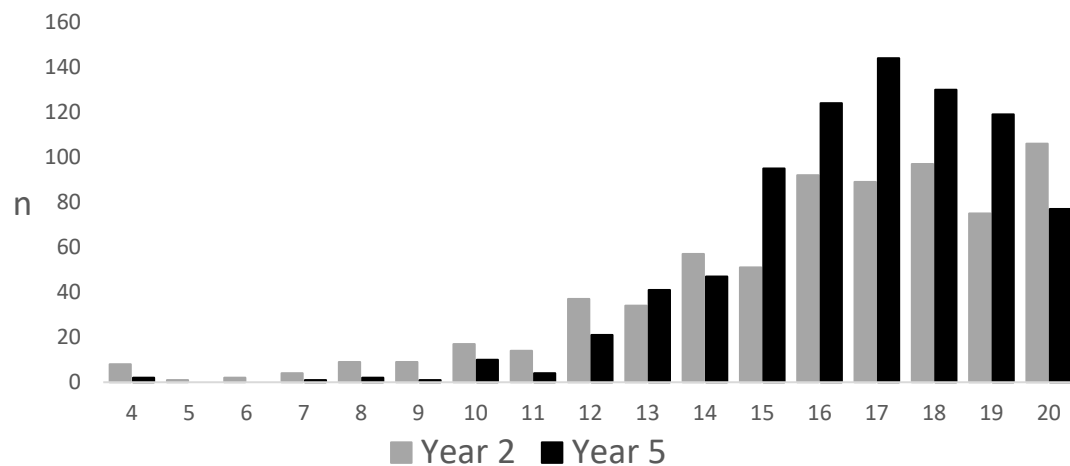


Figure 2. Distribution of scores for the VSWQ-C for Years 2 and 5. Y-axis label (n) refers to the number of children with each score.

Inter-item correlations for Years 2 and 5 were acceptable ( $r_s = .27$  for Year 2 sample and  $r_s = .33$  for the Year 5, see Table 3 for all correlations), and in line with those found for the KIDSCREEN-10 scale (Year 5 inter-correlation  $r_s = .24$ ).

Table 3.

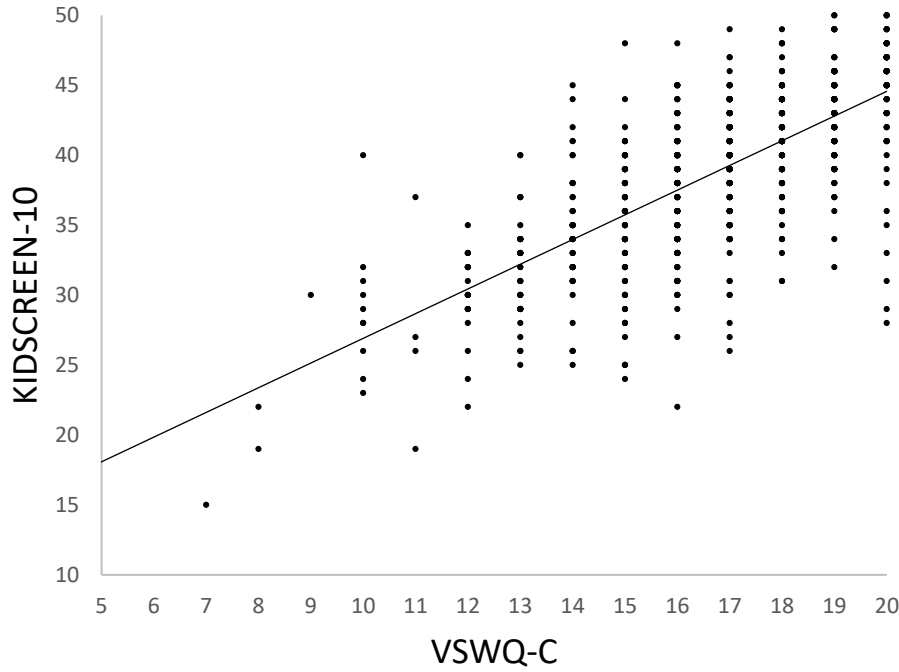
*Spearman's Rho correlations ( $r_s$ ) between VSWQ-C items:*

Year 2	Class	Home	Friends	Body
Year 5				
Class		.29	.32	.23
Home	.35		.29	.23
Friends	.39	.27		.27
Body	.32	.26	.28	

Note. Year 2 above the diagonal; Year 5 below the diagonal. All uncorrected correlations were significant at  $p < 0.01$  level.

*Internal reliability and construct validity.* Internal reliability relates to the extent to which the separate questions within a scale express a single concept (here, overall well-being). Cronbach's alpha reliabilities for Year 2 and Year 5 samples were “acceptable” (Year 2  $\alpha = .63$ ; Year 5  $\alpha = .66$ ), given the small number of items within the scale. Although Cronbach's alpha statistic is widely used, it has been found to suffer from limitations (Panayides, 2013; Raykov, 1997; Sijtsma, 2009) and particularly penalises scales with small numbers of items, such as our own (Streiner, 2003). We therefore ran an additional principle components analysis to assess for uni-dimensionality (i.e., whether or not the VSWQ-C formed a single scale), in an exploratory capacity as this was a new scale. Results supported a single factor for both Year 2 and Year 5 since eigenvalues were greater than 1 (i.e., 1.90 and 1.99 for years 2 and 5 respectively; range of factor-loadings were .59 to .74 for Year 2 and .65 to .78 for Year 5) and explained 47.5% and 49.7% of the variance respectively. And Kaiser-Meyer-Olkin showed that our measure of sampling adequacy (KMO) was acceptable for both samples (Year 2 = .71, Year 5 = .72). Our exploratory analysis therefore suggested that our four questions tested a single underlying dimension (well-being).

*Concurrent validity:* Concurrent validity relates to the extent to which our VSWQ-C is related to existing validated measures of the same construct (here, KIDSCREEN-10). Our Year 5 sample was administered both the VSWQ-C and the KIDSCREEN-10 scale and we found a strong positive association between the two measures ( $r_s = .71$ ,  $p < .001$ , Figure 2).

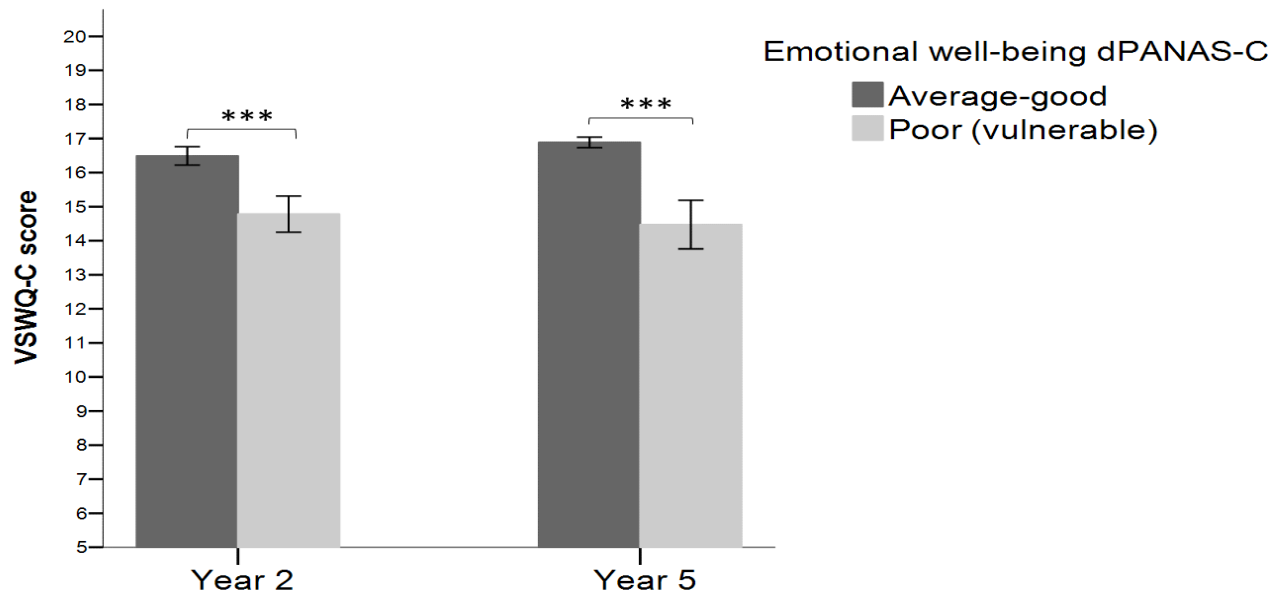


*Figure 3.* Shows the correlation between KIDSCREEN-10 (raw) and the VSWQ-C ( $r_s = .71$ ) for the Year 5 sample.

*Convergent validity:* Convergent validity measures the extent to which our VSWQ-C (a measure of well-being in health and quality-of-life) is related to measures that are not identical but nonetheless expected to be related to some extent (dPANAS-C positive and negative affect, which measure emotional well-being). Our analyses showed significant convergent validity in Year 2 and Year 5 data. Both PANAS subscales (negative and positive) were moderately associated with VSWQ-C in both the Year 2 and the Year 5 samples (Year 2:  $r_s = -.28$  [negative] and  $.30$  [positive]; Year 5:  $r_s = -.43$  [negative] and  $.48$  [positive], all  $p < .001$ ), where lower levels of negative emotions and higher levels of positive emotions were associated with greater well-being ( $r_s$ ).

Finally, children responding especially poorly on the dPANAS-C (i.e.,  $\leq 10$  in dPANAS-C-POS;  $\geq 16$  in dPANAS-C-NEG) could be considered a vulnerable group, who would therefore be expected to score significantly lower than their peers on the VSWQ-C. This hypothesis was

supported by t-tests (with bootstrapping for 1000 samples and corrected for unequal variances) in both Year 2;  $t(269.29) = 5.67, p < .001, d = 0.60, 95\% \text{ CI } [1.09, 2.31]$  and Year 5;  $t(84.70) = 6.58, p < .001, d = 0.89, 95\% \text{ CI } [1.09, 2.31]$ .



*Figure 4.* Shows the relationship between emotional vulnerability (from dPANAS-C) and our scores in VSWQ-C for Years 2 and 5. Error bars show 95% confidence intervals.

### ***Validating the dPANAS-C***

In this section we repeat similar validations in Years 2 and 5, but this time for the dPANAS-C, which is split into negative and positive dimensions. Tables 4 and 5 shows the inter-item correlations for the scale's positive and negative items respectively. Inter-item correlations were good for both the positive scale and negative scales (positive:  $r_s = .32$  for Year 2 and  $r_s = .40$  for Year 5; negative:  $r_s = .32$  for Year 2 and  $r_s = .35$  for Year 5). As such, both positive and negative scales have items that are tapping different facets of well-being but are moderately related.

Table 4.

*Spearman's Rho correlations ( $r_s$ ) between dPANAS-C positive items*

Year 2	Happy	Joyful	Cheerful	Lively	Proud
Year 5					
Happy		.39	.34	.21	.28
Joyful	.57		.41	.34	.40
Cheerful	.51	.55		.30	.27
Lively	.30	.36	.31		.25
Proud	.38	.37	.32	.26	

*Note.* Year 2 above the diagonal; Year 5 below the diagonal. All uncorrected correlations were significant at  $p < 0.01$  level.

Table 5.

*Spearman's Rho correlations ( $r_s$ ) between dPANAS-C negative items*

Year 2	Sad	Scared	Miserable	Afraid	Mad
Year 5					
Sad		.29	.41	.27	.22
Scared	.30		.37	.48	.26
Miserable	.51	.28		.40	.38
Afraid	.30	.54	.31		.24
Mad	.37	.23	.35	.26	

*Note.* Year 2 above the diagonal; Year 5 below the diagonal. All uncorrected correlations were significant at  $p < 0.01$  level.

*Internal reliability and construct validity:* Cronbach's alpha reliabilities for Year 2 and Year 5 samples were “acceptable to good” for both years and both positive and negative dimensions (see Table 6 below).

Table 6.

*Cronbach's alpha ( $\alpha$ ) of dPANAS-C measures for Year 2 and Year 5 children*

	dPANAS-C-POS	dPANAS-C-NEG	n
Year 2	.68	.70	702
Year 5	.77	.75	818

Because PANAS was an existing measure, already validated, we ran a confirmatory Factor Analyses (using a robust Weighted Least Squares estimation [WLSM], to deal with non-normality). Results supported the expected 2 factor model (for negative and positive affect) for both Year 2 and Year 5 since fit indices for Year 2 were RMSEA = .051, CFI = .98, TLI = .97 and for Year 5 were RMSEA = .097, CFI = .96 TLI = .95. With two modifications (correlating errors for the ‘sad’ and ‘afraid’ items, and ‘sad’ and ‘happy’) the Year 5 model improved to RMSEA = .087, CFI = .97, TLI = .96.

*Convergent validity:* Part of the convergent validity for the dPANAS-C comes from our comparable analysis above between VSWQ-C and dPANAS-C (see ‘Validating the VSWQ-C: Convergent validity’). Well-being is as a multifaceted construct (Huebner, Gilman, & Laughlin, 1999), but individual components of well-being are generally found to be moderately associated within the literature (Kern et al., 2007; Liddle & Carter, 2015; Lindert, Bain, Kubzansky, & Stein, 2015; Sánchez-García, Lucas-Molina, Fonseca-Pedrero, Pérez-Albéniz, & Paino, 2018;). We therefore used Kidscreen-10 as convergent validity for dPANAS-C

alongside the VSWQ-C. When we compared the dPANAS-C positive and negative domains against KIDSCREEN-10, collected from Year 5 and found a “large” association between them ( $r_s = .53$  and  $-.57$  respectively, both  $p_s < .001$ ; Cohen, 1992; Cohen, 1988).

### **Effects of gender and age on well-being, taking into account pupils, classes and schools**

To further support the usefulness of our tools, we investigated the impact of gender and age through linear mixed effects modelling while taking into account variability at the level of pupil, class and school. Linear mixed effects provide more robust estimates of fixed effects than traditional regression methods when data is clustered (Goldstein, 2011; Raudenbush & Bryk, 2002). Our hierarchically-structured data (pupils within classes within schools) make it essential to model the influence of the different levels of clustering within the data separately, estimating the contribution each made to the total variance in well-being scores. Nonetheless, we may not expect effects at all levels, since class and school are known to be weaker influences for well-being/affect compared to other influences (Gutman & Feinstein, 2008; Opdenakker & Van Damme, 2000; Sammons et al., 2011).

We first carried out checks for multi-collinearity prior to running the models, and all were within acceptable boundaries (no correlation exceeding .3; Field, 2009). We next assessed the levels (pupil, class, school) to enter into our model by checking which might be contributing variance to our questionnaire scores. We found that school was non-significant for both Years 2 and 5 (i.e. no significance variance between schools in any of the well-being measures investigated). Therefore, we removed school and ran a 2-level model (with class, pupil as random effects) including as predictors: year group, gender, and age-within-year-group. Analyses were run in MLwiN, using Maximum likelihood estimation and Bootstrapping, and taking a conventional alpha threshold of  $p < .05$ .

Significant effects were found for year group but not gender (see Table 7). Older children (Year 5) showed greater quality-of-life ratings (VSWQ-C) and fewer negative emotions (dPANAS-C-NEG) than younger (Year 2). We also found an effect of age-within-year in that older children within their year group experience fewer negative emotions (dPANAS-C-NEG) than younger children. Both age findings are compatible with studies elsewhere (McLellan & Steward, 2015). Finally, there was no effect of gender. Although some studies have found gender differences in affect or (specific domains of) quality of life, findings are largely mixed (Chorpita, Daleiden, Moffitt, Yim, & Umemoto, 2000; Jacques & Mash, 2004; Lonigan, Hooe, David, & Kistner, 1999; Michel, Bisegger, Fuhr, Abel, & group, 2009; Sammons et al., 2008) and other research suggests that gender differences emerge closer to puberty (McLellan & Steward, 2015; The Children's Society, 2017; Sanmartín et al., 2018).

Table 7.

*Parameter estimates for variance component mixed effects model for VSWQ-C, and dPANAS*

	VSWQ-C			dPANAS-C-POS			dPANAS-C-NEG		
	Estimate (SE)	<i>p</i>	<i>d</i>	Estimate (SE)	<i>p</i>	<i>d</i>	Estimate (SE)	<i>p</i>	<i>d</i>
<i>Fixed</i>									
Intercept	16.06 (0.13)			19.21 (0.19)			11.47 (0.22)		
Girls (vs boys)	<i>nf</i>			<i>nf</i>			<i>nf</i>		
Yr 5 (vs Yr 2)	0.60 (0.17)	***	0.21	<i>nf</i>			-2.27 (0.30)	***	-0.55
Age †	<i>nf</i>			<i>nf</i>			-1.14 (0.35)	**	-0.18
<i>Random</i>									
Between class v.	0.12 (0.08)			0.37 (0.20)	*		0.65 (0.26)	***	
Within class v.	8.04 (0.30)			18.70 (0.69)			17.26 (0.64)		
<i>Model fit</i>									
Loglikelihood	7501.723			8788.959			8682.949		

*Note.* *nf* not fitted; † Age is within year group and mean centred age (child's age minus the mean age for the year group); *p* likelihood ratio test significance show: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ; v. variance; Bootstrapped models confirmed these results. Covariates were removed that did not improve the model fit

## Discussion



The aim of our study was to investigate both whether children as young as 6 years could report accurately on their own well-being using written self-report questionnaires, and whether very brief measures of well-being can be psychometrically robust. Presented here was our newly-created *Very Brief Well-being Questionnaire for Children* (VSWQ-C), a health-related quality-of-life scale designed to be suitable from the age of 6 years (and possibly younger – see below). Existing measures of well-being are for use from middle childhood onwards and are usually longer and more linguistically complex. Our linguistic analyses show that the language in our novel VSWQ-C would on average, already have been acquired by the youngest children we surveyed and may be understandable to yet-younger children, from Year 1 (5 years). We also collected preliminary validation evidence for an adaptation of an existing questionnaire, after first defining its vocabulary with age-appropriate language. We collected preliminary validation evidence for this *Definitional Positive and Negative Affect Schedule for Children* (dPANAS-C) and our VSWQ-C on two large representative samples of Year 2 (age 6-7) and Year 5 (age 9-10) English primary school pupils.

We found that the VSWQ-C had acceptable internal reliability using Cronbach's (but this is a questionnaire that penalises short scales such as our own) and showed significant unidimensionality. Linear mixed effects models investigated the effects on well-being of age and gender, while taking into account variance from pupil, class, and school. We found the VSWQ-C showed excellent concurrent validity and moderate convergent validity in both age groups. The VSWQ-C scale proved to be strongly related to the KIDSCREEN-10 quality-of-life scale, suggesting it successfully tapped into global well-being, while being a far shorter questionnaire.

It should be remembered that the VSWQ-C is a reduced well-being scale which still covers a number of relevant well-being domains (home life, school life, friends, health) but excludes emotional (mood) well-being. However, we also found that younger children (6 years old) could reliably report on their emotional well-being too, using the dPANAS-C. Our Year 2 children were up to two years younger than this questionnaire was psychometrically developed for without our modifications (as the PANAS-C; Laurent et al., 1999). Nonetheless we found that our definitional adaptation was robust for children of 6 years old and even when surveyed within a large group setting. Our data therefore contributes to the repository of useable testing tools that can be applied to younger children in infant and junior school education. These data validate very short, written, early-years questionnaires which can test for both health-related quality-of-life (VSWQ-C) and emotional/ mood (dPANAS-C) well-being.

Our analyses here add to the literature on young children's ability to report their own perspectives of experience. There was a tendency for older children to report more favourably about their general well-being overall: Older children reported more positive quality-of-life well-being in the VSWQ-C compared to younger children (and also in KIDSCREEN-10) and fewer negative emotions in the dPANAS-C NEG (see also (McLellan & Steward, 2015)). However, in our samples there was a degree of ceiling effect in the most positive responses to the VSWQ-C, with 15% in the Year 2 sample and 9% in the Year 5 samples responding 'always' to all four items. This pattern was also found for the dPANAS measures, more so for positive emotions: 17% in the Year 2 sample and 4% in the Year 5 samples answered the most positive response to all five items in the dPANAS positive scale (i.e. extreme positive affect); and 9% in the Year 2 sample and 14% in the Year 5 samples responding answering the least negative response (i.e. little or no negative affect) to all five items in the dPANAS negative scale). This may reflect a tendency for younger children to polarise their responses, or may

indeed reflect less control of emotions. Non-Gaussian distributions are not uncommon in affective and well-being data and are frequently found elsewhere (Gadermann, Schonert-Reichl, & Zumbo, 2010; Muldoon, Levin, van der Sluijs, & Currie, 2010; Raat, Botterweck, Landgraf, Hoogveen, & Essink-Bot, 2005). There were no gender differences within the ages we surveyed, in that boys and girls reported equivalent levels of well-being in both VSWQ-C and the dPANAS-C. These results contribute to a somewhat mixed view of how well-being interacts with age (Chorpita, Daleiden, Moffitt, Yim, & Umemoto, 2000; Jacques & Mash, 2004; Lonigan, Hooe, David, & Kistner, 1999; Michel, Bisegger, Fuhr, Abel, & group, 2009; Sammons et al., 2008) and with a body of studies suggesting differences emerge closer to puberty (McLellan & Steward, 2015; Sanmartín et al., 2018; Society, 2017).

Our research here responds to a need for well-being measures to be age and cognitively appropriate (Merrell, 2013; Ripke, Hudson, Eccles, & Templeton, 2008). We point out that our sample included children of all abilities, including those with Special Educational Needs. Although the present measure is designed for the general population, it would be useful to gather additional data from a clinical sample in particular. In total approximately 14% of our sample would be expected to have some degree of Special Educational Needs or Disability (SEND; Department for Education, 2017) and our future research anticipates being able to split our sample into children with and without an SEND profile. At present, our recommendation would be to use this instrument only for children within a typical range of cognitive ability, although separate analyses on special populations (e.g., children with autism) could potentially provide a second set of validations. Such validation might be useful because these populations may benefit especially from short measures such as the VSWB-C, although such children may ultimately require individual rather than class-wise testing. This is because the effects of lower comprehension or attention may be exacerbated by administering the measure within a classroom

setting.

Our VSWQ-C measure was designed to be concise, and quickly administered but this strength also leads to limitations. One issue with a short questionnaire is that it is restricted in the aspects of well-being it can incorporate. For example, we did not include emotional well-being such as happiness, although our alternative measure the dPANAS-C can be run quickly in parallel, as done here. Another limitation of our study is that we were not able to investigate test-retest reliability because our data could be collected at one time-point only. Future validation would therefore be useful to examine its stability over both short and long term. This might be done with a novel cohort, perhaps also extending the age of our sample to include yet-younger children from Years 1 (to explore the lower boundaries of age our tools might be suitable for). Future studies might also examine the utility of these brief well-being measures in terms of predicting other aspects of children's development (e.g., curriculum and behavioural outcomes).

In summary, our novel VSWQ-C scale and our adapted dPANAS-C allowed children from the age of 6 to accurately report their general well-being. Our measures related strongly to longer, more linguistically complex instruments designed for older children (e.g., KIDSCREEN-10). Our measures benefit from being questionnaires that can be administered quickly, within a class setting, on an electronic tablet if desired, and to young primary-school aged children. As such, our questionnaires also provide a useful initial screening for larger numbers of children, or when time constraints limit longer diagnostic tests.

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## **Appendix 1. VSWQ-C: A Very Short Well-being Questionnaire for Children.**

Below is a script for instructions followed by screen-shots of the questionnaire, which can be administered either on-screen or using pencil and paper. The wording is suitable for on-screen questionnaires but square brackets present alternates for pencil-and-paper questionnaires.

### *Instructions for VSWQ-C.*

{Children begin by looking at the waiting-screen} “In a minute we’re going to ask about how you felt this week. We don’t want you to start just yet, but when once you begin, these are the questions you’ll see.

{Experimenter holds up a tablet [or screen-shot] showing the 4 questions and says} “These questions ask how you felt during the last week. We want you to read the question, then choose the answer that best describes how you felt, and tap [/ tick] the answer. So the first question says Thinking about the last week... Have you got on well in class? If you never got on well in class during the last week you would press ‘Never’. {Experimenter points to ‘Never’}. If you got on well in class just a tiny bit but hardly ever, you press “Hardly ever” {Experimenter points}. If you got on well in class sometimes press “Sometimes”. If you got on well in class most of the time press “Mostly” {Experimenter points}. Or if you got on well in class this week all the time press “Always”. So think about how you felt during the last week and answer about yourself – not anyone else. There’s no right or wrong answer – you decide!

So there are four questions: we’ll ask whether you got on well in class, then whether you got on at home, then whether you got on with your friends, and question 4 asks whether your body felt well.

We won't show your answers to anybody you know. And if you're not sure just tap [tick] the answer that pops into your mind first. So how have you been feeling this week? Click start and begin now. [Begin now]"

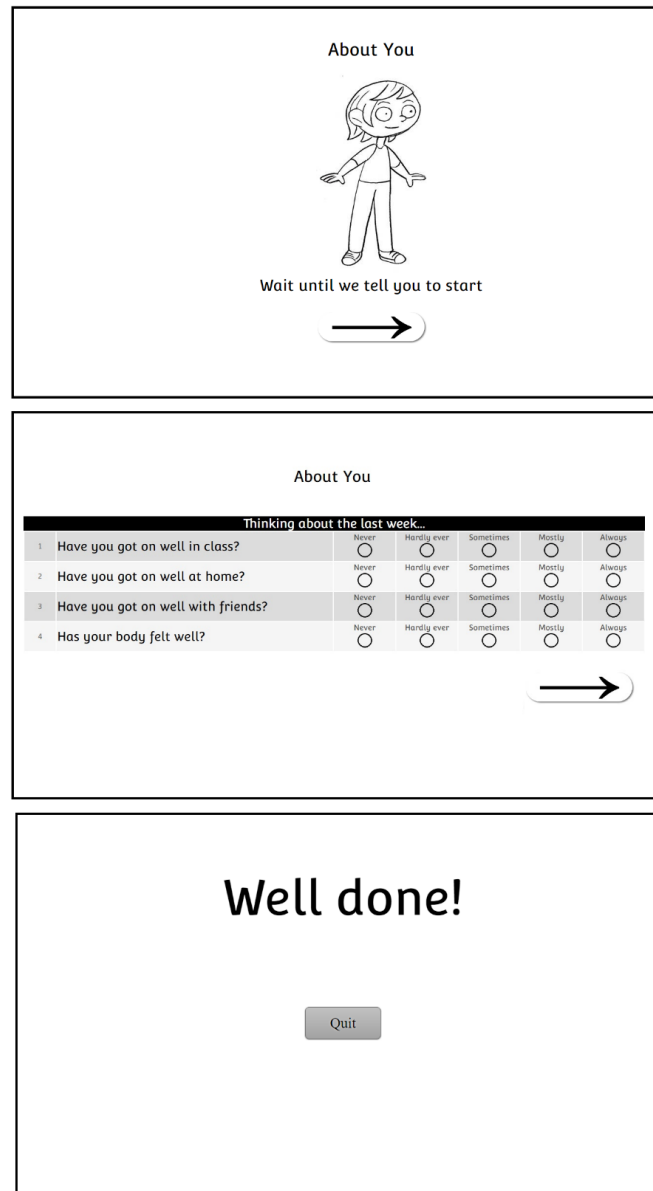


Figure Appendix-1. Screen shots of the VSWQ-C which can be presented electronically (as shown) or using pencil-and-paper without the advance (arrow) button. Instructions are given while the waiting-screen (top) is shown. Children then advance to the questionnaire (middle) and are then applauded for their efforts (bottom).

## **Appendix 2. dPANAS-C: A Definitional Positive and Negative Affect Scale for Children.**

Below is a script for instructions followed by screen-shots of the questionnaire, which can be administered either on-screen or using pencil and paper. The wording below is suitable for on-screen questionnaires but square brackets present alternates for pencil-and-paper questionnaires.

### *Instructions for dPANAS-C.*

{Children begin by looking at the waiting-screen} “We are going to answer some questions now about feelings and emotions like happy and scared.

{Experimenter holds up a tablet [or screen-shot] showing the first item HAPPY and says} “I want you to think about yourself and how much you’ve felt that emotion this week. Press the button which matches how you have been feeling this week. So if you have not really been feeling very happy this week then you would press the button that says “Very slightly”, if you have felt happy a little bit then you press the button that says “A little”. If you have felt happy a medium amount of time then press the button that says “Moderately” if you have felt quite happy then press the button that says “Quite a bit” and if you have felt very very happy then press the button that says “Extremely”.

OK press start and begin.”

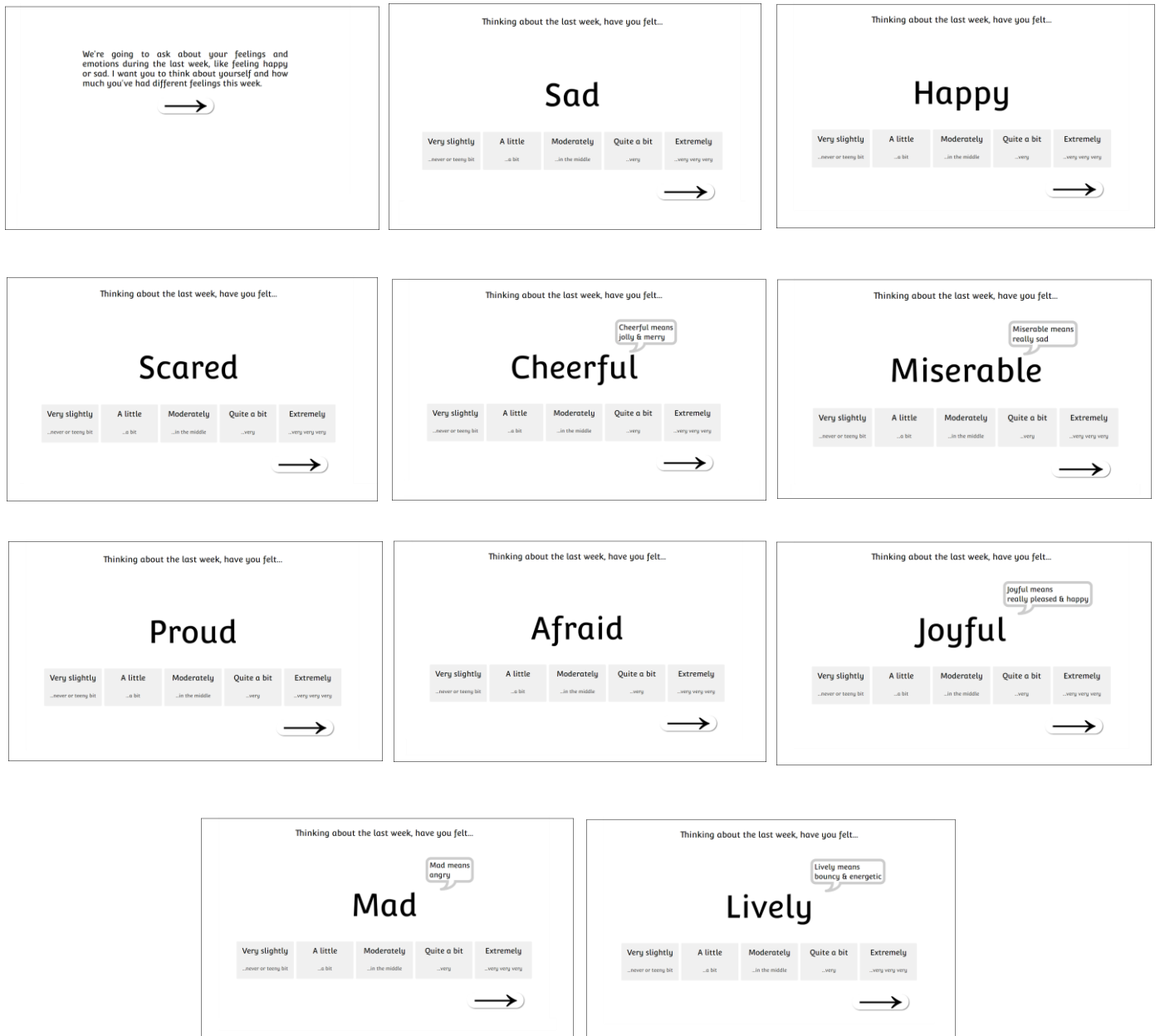


Figure Appendix-1. Screen shots of the PANAS-C which can be presented electronically (as shown) or using pencil-and-paper without the advance (arrow) button. Instructions are given while on the first screen and also verbally by the researcher. Adapted from the PANAS-C (Ebesutani et al., 2012).